

#### TITLE OF THE INVENTION

Non-Rotating Display Wheel Cover

#### CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable

#### STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable

#### INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not applicable

#### BACKGROUND OF THE INVENTION

##### Field of the Invention

This invention relates generally to vehicle wheel covers, and more particularly to a commercial display wheel cover including a replaceable display disc which remains substantially stationary with respect to the vehicle while the vehicle is moving.

##### Description of Related Art

The central outer portion of a vehicle wheel, being fully viewable while the vehicle is in motion, provides an opportunity for the placement of readable graphics in this otherwise merely decorative or unornamental portion of the wheel of larger utility vehicles such as buses or trucks as well as all passenger cars. The utilization of this otherwise merely unadorned space is contingent upon the readability of graphics and word messages being held relatively stationary with respect to the vehicle in motion. A number of prior art patented inventions address this display and advertising opportunity.

In U.S. Patent 5,659,989, Hsiao teaches a wheel cover which includes an outer disc member which is rotatably mounted to an inner base member so that the display indicia applied to the disc member will remain substantially rotation free under vehicle movement. This disclosure includes stabilizing structure to maintain alignment and restrict oscillation of the outer disc member bearing the viewable indicia thereon.

Boothe, in U.S. patent 5,957,542 discloses a theft-proof, non-rotational wheel cover with replaceable ornamental outer surface. This arrangement relies upon and is engageable within the central cavity of the automotive wheel.

Another advertising display device for a vehicle wheel is disclosed by Ryan in U.S. Patent 2,548,070. In this arrangement, however, the device is adapted for attachment to a non-rotatable axle of the motor vehicle.

In U.S. Patent 2,869,262, Lucas teaches another wheel-supported advertising sign arrangement which appears to attach in rotatable fashion to the outer hubcap of the wheel assembly.

In the disclosure of Kovalenko, in U.S. Patent 4,280,293, a stationary display member is attachable to the vehicle hub and utilizes a flowable material such as mercury acting upon veins within a chamber of the device to substantially eliminate rotation of the bearing-mounted outer display member.

A non-rotating wheel cover assembly shown in U.S. patent 5,588,715 invented by Harlen teaches yet another wheel cover assembly which is attachable to the outer end of an axle by separate bracketry to support the bearing mounted display member. A thickened lower portion of the wheel cover provides sufficient counterbalance to inhibit or prevent rotation of the display cover while the vehicle is in motion.

Matsushita discloses a free wheel cap in U.S. patent 4,678,239 which teaches a non-rotating wheel cover having a counterbalanced disc-like body which is bearing connected to an inner multi-arm structure having spring-like clips connected at the outer periphery of the device which interengage with the wheel rim.

Another wheel cover was invented by Okamoto and disclosed in U.S. Patent 6,120,104 teaching a flexible side feature connected to the center of the wheel in support of a display wheel cover. An air current guide is formed into the display cover which assists in stabilizing the display portion without substantial rotational movement as the vehicle is moving.

Other prior art devices which teach vehicle wheel display covers are as follows:

U.S. Patent 710,195 to Jones

U.S. Patent 2,014,058 to Tonai

U.S. Patent 2,169,237 to Gasco

U.S. Patent 4,781,419 to Boothe

U.S. Patent 5,190,354 to Levy

U.S. Patent 5,490,342 to Ruterma

U.S. Patent 6,536,848 discloses a display wheel cover which is substantially non-rotating with respect to the vehicle when in motion and which, in a preferred embodiment, utilizes a unique inner member having an elongated hat-shaped section that facilitates attachment to the rim of the wheel by threadably adjustable rim-engaging members that align into the concave groove formed in the outer wheel rim. A unique cam-locking device both retains the outer display wheel cover in place and also prevents its theft removal as a separate security feature requiring a special tool for removal.

## BRIEF SUMMARY OF THE INVENTION

This invention is directed to a display wheel cover assembly uniquely connectable to a rotatable wheel of a vehicle. This invention includes an inner member rigidly connectable by unique replacement lug nuts to the outside of the wheel serving as combination spacers and lug extensions and having a support-bearing member positioned coaxially with the wheel. Another embodiment includes double-ended lugs which first threadably engage into at least some of the lugs attached to threaded holes formed into the axle hub of heavy trucks. A wheel cover having a coaxially extending support shaft is rotatably supported in the support-bearing member. An elongated cylindrical locking member is positioned within a longitudinal aperture formed through the support shaft. A cam member, connected to a distal end of the locking member, has a non-symmetric periphery such that, when properly rotatably orientated, are fully insertable into said support bearing member. In a second rotational orientation, the cam member prevents withdrawal of the support shaft from the support-bearing member. A counterweight attached to the wheel cover prevents rotation of the wheel cover. Interchangeable display indicia attach to the wheel cover.

It is therefore an object of this invention to provide a non-rotating wheel cover for commercial utility vehicles, trucks and automobiles which will facilitate the application of decorative and readable commercial display indicia such as in advertising while the vehicle is moving.

It is yet another object of this invention to provide an advertising display cover for the wheel of a commercial vehicle which is easily interchangeable and which is rendered secure from inadvertent or theft removal by a unique locking arrangement.

Still another object of this invention is to provide an advertising display cover for the wheel of a vehicle which receives support from the lugs of the axle of the vehicle through the use of uniquely configured double-duty wheel lug nuts serving as spacers and lug extensions.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Figure 1 is an exploded perspective view of one embodiment of the invention shown in conjunction with a wheel of a vehicle.

Figure 1A is an exploded perspective view of another embodiment for attachment to vehicles having a central axle hub bolt pattern.

Figure 2 is an exploded side elevation view in section of Figure 1 also showing the axle of the vehicle.

Figure 3 is an enlargement of the central area of Figure 2 assembled.

Figure 4 is an inside elevation view of Figure 6.

Figure 5 is a section view in the direction of arrows 5-5 in Figure 4.

Figure 6 is an inside perspective view of the support shaft and locking mechanism which is mechanically attachable to the inner surface of the wheel cover as shown in Figures 1 to 3.

Figure 7 is an enlarged perspective view from the wheel side of the central area of the inner member and locking mechanism.

## DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, the preferred embodiment of the invention is shown in Figure 1 generally at numeral **10**. An alternate embodiment is shown generally at numeral **10'** in Figure 2, the difference in the embodiments **10** and **10'** being in the forms of the outer wheel covers **12** and **12'**. Each of these wheel cover assembly embodiments **10** and **10'** are attachable to a wheel **R** of a preferably commercial vehicle (not shown), the wheel **R** supporting a conventional inflatable pneumatic tire (not shown) for supporting the vehicle. The wheel cover assemblies **10** and **10'** each include the outer wheel cover **12** or **12'**, respectively, having a replaceable disc-shaped display member **32** or **21**, respectively, attached to the outer surface thereof. These display members **32** and **21**, preferably in the form of adhesive backed thin film imprinted with any desired viewable indicia, may each bear any form of commercial advertising indicia as desired and may be replaced with another display member having a different commercial message at appropriate times. Facilitated by the present invention **10** and **10'**, then, the readable indicia on each display member **32** and **21** are maintained in a stationary orientation with respect to the vehicle even while the vehicle is in motion.

Each of the assemblies **10** and **10'** also includes an inner member shown generally at numeral **14** connectable for relative rotation only to the outer wheel cover **12** as described herebelow. The inner member **14** includes a generally flat disc-member **26** which is circular about a centerline **D** coaxial with the center line of the rim **R** of the wheel **W**. Circular wheel cover **12** in Figure 1 receives the generally flat circular display or advertising disc **32** attached thereto by conventional means (not shown). The wheel cover **12'** in Figure 2 also includes an elongated cross sectional configuration, the

circular, flat outside surface **22** receiving the generally flat circular display or advertising disc **21** attached thereto by conventional means (not shown). The outer periphery **20** of the wheel cover **12'** extends outwardly and inwardly from the generally flat central portion **18** so as to protectively surround the outer periphery of the inner member **14**.

The circular disc **26** includes apertures **28** which are adapted to align with the size, spacing and configuration of wheel lugs **G** seen in Figure 2 attached to the axle of a drive line **B**. These lugs **G** also pass through the wheel mounting holes **H** of the wheel **R**.

A uniquely configured elongated wheel attaching lug **32**, also acting as a spacer or lug extension, is also provided. One end **42** of this lug or lug extension **32** is adapted to threadably engage over the lug **G** after the wheel **R** is positioned against axle **A** to effect secure installation of the wheel **R**. Note that at least three, and alternately up to all, of the lugs **G** receive one of the elongated threaded lug extensions **32**, the remaining lugs receiving one of the existing lug nuts (not shown) for economy. However, it is envisioned that at least three of the threaded lugs or extensions **32** would be required to stabilize the installation of the inner member **14** as described immediately herebelow.

After the wheel **R** is secured to the lugs **G** of axle **A**, the circular disc **26** is fitted onto the opposite end **44** of each of the lugs **32** through its mounting holes **28**. Thereafter, lug nuts **62** are tightened in place onto threaded portion **44** to effect full and secure installation of the inner member **14**. Note that, for economy, the existing lug nuts originally installed on lugs **G** by the vehicle manufacturer may be used in place of the lug nuts **62** provided. Circular disc **26** is provided with material lightening apertures **30** for economy and inspection purposes. Note also that lug extension **32** may be of any

selected overall length which will establish a desired spaced relationship between the inner member **14** and the facing surface of wheel **R**.

Referring now to Figure 1A, a rear axle flange **M** associated with large trucks and busses is assembled together by lugs **N** through mating apertures **H'** which are separate from the lugs **J** and lug nuts **K** which attached the rim **R'** to the axle of the truck or bus. The larger bolt circle for the wheel mounting lugs **J** and lug nuts **K** are formed into the central web **L** of the rim **R'** as shown.

To accommodate this axle hub **M** arrangement, an elongated attaching lug **32'** is provided. This attaching lug **32'** has a first end which is threaded similar to lug **N** and is threadable into the threaded cavities **H'** of the axle hub **M**. Typically, there are eight or ten such lugs **N** utilized to assemble the axle hub **M** and it is thus preferred to replace only a portion (typically three) of those standard lugs **N** by the attaching lugs **32'**.

As previously described, the inner member **14'** includes a flat disc member **26** having apertures **28'** which are sized in diameter and adapted to align with, the spacing and configuration of the bolt pattern of the axle hub **M**. After the attaching lugs **32'** are installed into a portion of the threaded holes **H'**, the threaded opposite ends **44'** of the attaching lugs **32'** are passed through the mounting holes **28'** and thereafter, lug nuts (not shown) are threadably tightened in place onto each of the threaded portions **44'** to effect full and secure installation of the inner member **14'**.

As best seen in Figures 2 and 3, the inner member **14** further includes a support bearing member **54** which is rigidly connected to the outer surface of member **26** by its annular flange **54b** and radial flange **54a**. Included within the support bearing member **54** are two spaced roller bearings **56** and **58** which supportively receive a support shaft **36**



having an enlarged mounting flange **16** which is rigidly attached to the central inner surface of the wheel cover **12'** within a mating cavity **24** by threaded evenly spaced threaded fasteners **59**. The mounting flange **16** is alternately rigidly attached to the inner surface of wheel cover **12** by threaded fasteners **59** (not shown in Figure 1). For lighter-duty vehicles, fasteners **59** are eliminated and replaced by over molding mounting flange **16** when mold forming the wheel cover **12'**.

The outer cylindrical surface of the support shaft **36** is closely aligned for snug or close sliding fit within the inside diameter of the support bearings **56** and **58**. By this arrangement, the support shaft with the display cover **12** rigidly connected thereto and outwardly positioned therefrom, is slidably engageable into the bearings **56** and **58** of the support bearing member **54**.

The locking and anti-theft features of the invention are best seen in Figures 3 to 7. An elongated cylindrical locking member is there shown at numeral **38** including an elongated cylindrical shaft and an enlarged headed portion having a unique drive slot **55** formed therein. The locking member **38** snugly and slidably engages within an elongated aperture formed longitudinally through the support shaft **36**. Note importantly that the axis **E** of the elongated locking member **38** is offset from the longitudinal axis **D** which is concentric with the outer cylindrical surface of the support member **36**, the wheel **W** and the inner member **14**.

A cam member **40** is mechanically attached by a set screw **50** to the distal end of the locking member **38**. A detent ball **42** and spring as seen in Figure 6 form a detent which snapably engage into a cavity **44** formed in the inner face of the cam **40** which mates against the distal end surface of the support shaft **36**. A tab **52**, which extends

inwardly from the distal surface of the support shaft **36**, engages against a notched surface **46** or **48** of the cam member **40** to limit the rotation in the direction of the arrow about axis **E** as best seen in Figure 7.

By this arrangement, the cam member **40** may be moved into a rotational orientation as shown in Figure 6 so that it is in substantially cylindrical alignment within the cylindrical projected envelope defined by the support shaft **36** allowing insertion of the support shaft **36** into the support bearing member **54** as best shown in Figure 7. Thereafter, the locking member **38** may be rotated to another orientation of the cam member **40** by the insertion of a uniquely configured turning member or key (not shown) into cavity **55** wherein the cam member **40** rotating about offset axis **E**, causes an interference against the distal end of the support shaft **36** preventing removal of the wheel cover **12**.

By this arrangement of providing a uniquely configured cavity **55** or a key slot arrangement, the locking member **38** may only be rotated into the unlocked position of cam member **40** shown in Figure 6 for removal of the wheel cover **12** by the holder of such a turning member or key.

Note that the above-described locking cam member **40** and accompanying mechanism may be replaced with a well-known quick-release arrangement such as spring loaded laterally extending locking balls which withdraw upon depressing a release shaft having a tapered ramp portion acting upon the locking balls to effect lateral movement thereof between a locked and a released position of shaft **16** within.

While the instant invention has been shown and described herein in what are conceived to be the most practical and preferred embodiments, it is recognized that

departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be afforded the full scope of the claims so as to embrace any and all equivalent apparatus and articles.